Final Report for NAG5-8658

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This is my final report on the NASA ATP grant on nucleosynthesis, rotation and magnetism in accreting neutron stars (NAG5-8658). In my last two reports, I summarized the science that I have accomplished, which covered a large range of topics. For this report, I want to point out the graduate students that were partially supported on this grant and where they are now. **Andrew Cumming** is an Assistant Professor of Physics at McGill University, **Greg Ushomirsky** is a researcher at MIT's Lincoln Laboratories, **Dean Townsley** is a postdoctoral researcher at Univ. of Chicago, **Chris Deloye** is a postdoctoral researcher at Northwestern University.

The other two students, **Phil Chang** and **Tony Piro**, are still at UCSB and will be completing their PhD's in Summer '05 and Summer '06.

The 32 papers that acknowledged this grant were:

1. "Nearly Coherent Oscillations in Type I X-Ray Bursts from KS 1731-260", M. P. Muno, D. W. Fox, E. H. Morgan and L. Bildsten, 2000, Ap J, **542**, 1016

2. "Rotational Evolution During Type I X-Ray Bursts" A. Cumming and L. Bildsten, 2000, Ap. J., **544**, 453

3. "Gravitational Waves from Low-Mass X-ray Binaries: A Status Report" Greg Ushomirsky, Lars Bildsten and Curt Cutler, to appear in Proceedings of the Amaldi Conference, eds. [astro-ph/0001129]

4. "Theory and Observations of Type I Bursts from Neutron Stars" L. Bildsten, to appear in "Cosmic Explosion" eds. S. S. Holt and W. W. Zhang [astro-ph/0001135]

5. "Deformations of Accreting Neutron Star Crusts and Gravitational Wave Emission" G. Ushomirsky, C. Cutler and L. Bildsten, 2000, MNRAS, **319**, 902

6. "Search for Millisecond Periodicities in Type I X-ray Bursts of the Rapid Burster" D. W. Fox, W. H. G. Lewin, R. E. Rutledge, E. H. Morgan, R. Guerriero, L. Bildsten, M. van der Klis, J. van Paradijs, C. B. Moore, T. Dotani, K. Asai, 2001, MNRAS, **321**, 776

7. "Gravitational Settling of 22Ne in Liquid White Dwarf Interiors" L. Bildsten and D. M. Hall, 2001, Ap. J., **549**, L219

8. " The Quiescent X-Ray Spectrum of the Neutron Star in Cen X-4 Observed with Chandra/ACIS-S" R. E. Rutledge, L. Bildsten, E. F. Brown, G. G. Pavlov, V. E. Zavlin, Ap. J., **551**, 921

9. " The Endpoint of the rp Process on Accreting Neutron Stars" H. Schatz, A. Aprahamian, V. Barnard, L. Bildsten, A. Cumming, M. Ouellette, T. Rauscher, F.-K. Thielemann, M. Wiescher 2001, Phys. Rev. Letters, **86**, 3471

10. "A Brown Dwarf Companion for the Accreting Millisecond Pulsar SAX J1808.4-3658" L. Bildsten and D. Chakrabarty 2001, Ap. J., **557**, 292

11. "A Search for Rapid Photometric Variability in Symbiotic Binaries" J. L. Sokoloski, L. Bildsten and W. C. G. Ho, 2001, MNRAS, **326**, 553

12. "Magnetic Screening in Accreting Neutron Stars" A. Cumming, E. G. Zweibel and L. Bildsten, 2001, Ap. J., **557**, 958

13. "Carbon Flashes in the Heavy Element Ocean on Accreting Neutron Stars" A. Cumming and L. Bildsten, 2001, Ap. J., **559**, L127

14. "Quiescent Thermal Emission from the Neutron Star in Aql X-1" R. E. Rutledge, L. Bildsten, E. F. Brown, G. G. Pavlov, V. E. Zavlin, 2001, Ap. J., **559**, 1054

15. "Hydrostatic Expansion and Spin Changes During Type I X-Ray Bursts" A. Cumming, S. M. Morsink, L. Bildsten, J. L. Friedman, and D. E. Holz, 2002, Ap. J., **564**, 343

16. "Faint Cataclysmic Variables in Quiescence: Globular Cluster and Field Surveys" D. M. Townsley and L. Bildsten, 2002, Ap. J., **565**, L35

17. "Transient X-Ray Binaries in Elliptical Galaxies" A. L. Piro and L. Bildsten, 2002, Ap. J., **571**, L103

18. "Four New Delta Scuti Pulsators from a Variability Survey of 131 Stars" J. L. Sokoloski, L. Bildsten, R. Chornock, and A. V. Filippenko, 2002, PASP, **114**, 636

19. "Variability in the Thermal Emission from Accreting Neutron Star Transients" E. F. Brown, L. Bildsten, and P. Chang, 2002, Ap. J., **574**, 920

20. "Variable Thermal Emission from Aql X-1 in Quiescence" R. E. Rutledge, L. Bildsten, E. F. Brown, G. G. Pavlov, V. E. Zavlin, 2002, Ap. J., **577**, 346

21. "Hot White Dwarf Donors in Ultracompact X-Ray Binaries" L. Bildsten, 2002, Ap. J., **577**, L27

22. "A Possible Transient Neutron Star in Quiescence in the Globular Cluster NGC 5139" R. E. Rutledge, L. Bildsten, E. F. Brown, G. G. Pavlov, V. E. Zavlin, 2002, Ap. J., **578**, 405

23. "Crustal Emission and the Quiescent Spectrum of the Neutron Star in KS 1731-260" R. E. Rutledge, L. Bildsten, E. F. Brown, G. G. Pavlov, V. E. Zavlin, and G. Ushomirsky, 2002, Ap. J., **580**, 413

24. "Photodisintegration-Triggered Nuclear Energy Release in Superbursts" H. Schatz, L. Bildsten and A. Cumming, 2003, Ap. J., **583**, L87

25. "Diffusive Nuclear Burning in Neutron Star Envelopes" P. Chang and L. Bildsten, 2003, Ap. J., **585**, 464

26. "Atomic Spectral Features During Thermonuclear Flashes on Neutron Stars" L. Bildsten, P. Chang and F. Paerels, 2003, Ap. J., **591**, L29

27. "White Dwarf Donors in Ultracompact Binaries: The Stellar Structure of Finite Entropy Objects" C. J. Deloye and L. Bildsten, 2003, Ap. J., **598**, 1217

28. "Nuclear Physics in Normal X-ray Bursts and Superblasts" H. Schatz, L. Bildsten, A. Cumming and M. Ouellette, 2003, Nuc. Phys. A, **718**, 247

29. "Periodic Thermonuclear X-ray Bursts from GS 1826-24 and the Fuel Composition as a Function of Accretion Rate" D. K. Galloway, A. Cumming, E. Kuulkers, L. Bildsten,

D. Chakrabarty, and R. E. Rothschild, 2004, Ap. J., **601**, 466

30. "Unstable Nonradial Oscillations on Helium Burning Neutron Stars" A. L. Piro and L. Bildsten, 2004, Ap. J., **603**, 252

31. "Evolution of Young Neutron Star Envelopes" P. Chang and L. Bildsten, 2004, Ap. J., **605**, 830

32. "New Views of Thermonuclear Bursts" T. Strohmayer and L. Bildsten, To appear in Compact Stellar X-Ray Sources, eds. W.H.G. Lewin and M. van der Klis, Cambridge University Press [astro-ph/0301544]